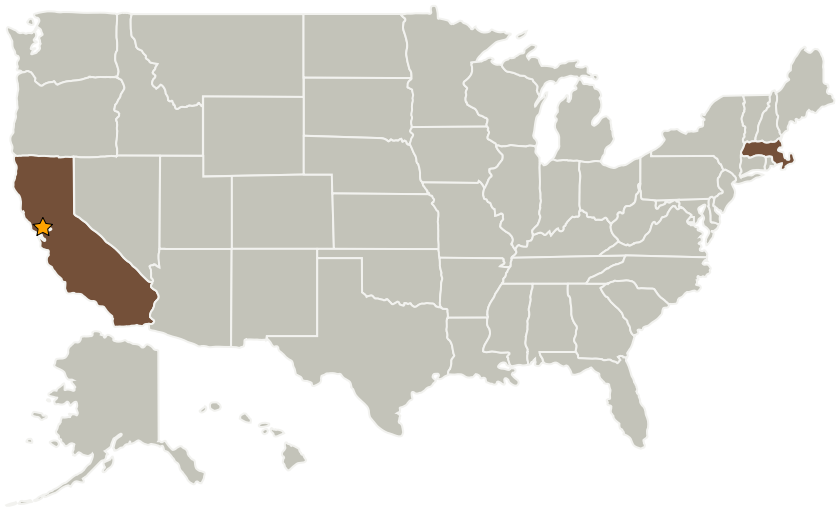
Coordinated Control of Multi-Agent Systems in Rapidly Varying Environments, Phase I

Completed Technology Project (2004 - 2005)

Project Introduction

In this STTR project Scientific Systems Company, Inc. (SSCI) and Brigham Young University (BYU) propose to design, implement, and test an Autonomous Coordinated Control And Management System (ACCAMS) for multiple Unmanned Air Vehicles (UAVs) engaged in cooperative missions under rapidly changing environment. Over the past few years, BYU has developed an effective approach for complex cooperative missions such as the coordinated multiple UAV rendezvous mission. In this project we plan to enhance this approach by integration of Failure Detection, Identification, and Reconfiguration (FDIR) algorithms, Achievable Dynamic Performance (ADP) estimation algorithms, and high level decision making logic to the control architecture. The integration of these algorithms allow the UAVs to make intelligent decisions in the presence of subsystem failures or external threats in an autonomous fashion. The FDIR algorithms detect and identify the failure when it occurs, and reconfigures the controller to continue the mission if possible. It also estimates the new ADP and pass this information to the upper layers to decide if the trajectory/path/mission need to be changed after the failure or threat has occurred. We also plan to conduct flight tests of the baseline coordinated control scheme to demonstrate the path planning and trajectory generation capabilities using the BYU fixed-wing UAV testbed during Phase I.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Scientific Systems Company, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Raman Mehra

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.6 Fault Response